

# ICT ages a Study on the Relationship between Oral Environment and Depression

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**Abstract.** In this paper, we analyze the relationship between oral health related factors and depression in middle-aged adults. In this study, we used crossover analysis to examine the relationship between demographic factors and depression in middle - aged adults and the relationship between depression and oral health factors in middle - aged adults. We also analyzed the frequency of depression in middle - aged adults. The oral health factors of middle-aged adults affected the depression, which could negatively affect the quality of life, thus suggesting motivation for oral health in middle-aged adults.

**Keywords:** Depression, Oral environment

## 1 Introduction

Middle age is the time where most energetic activities are made in life, and the time where people are immersed in the family life and social activities actively and make efforts to live as a member of the society[1]. Middle age is a kind of transition period from adulthood to old age, and the middle aged are responsible for supporting their children their parents, and severely affected on their physical and mental health due to stress arisen from their additional roles[2]. Depression among them is an emotional disorder which represents anxiety, somnolence, sense of failure, sense of loss, feeling of helplessness and sense of worthlessness due to negative perception of oneself and causes disruptions in the daily life or accompanies several different types of symptoms or signs. Since more than half of middle aged women experience, it is reported depression is a major health problem to women[3][4]. In addition, middle-aged men experience psychological anxiety, irritability, fatigue, and compassion on themselves and depression, often claim fatigue and resulting physical symptoms, while they experience physical changes as climacteric similar to menopausal symptoms in middle-aged women[5].

As the age increases, oral health decreases the due to oral diseases such as tooth loss, and the quantity and quality of the meals decrease due to narrowed choice of food to cause nutritional imbalance and difficulties in maintenance of health[6]. Since oral health is the condition of teeth and the maxillofacial oral tissue that are not infected by diseases, not cause problems in mental functioning and social life, and are

comfortable and functional teeth state to ensure the personal life may perform their social roles continuously[7], it has positioning as a main health evaluation item[8]. Although there are many studies on depression for the middle aged, there are not many studies related to the oral health and depression. Accordingly, the purpose of this study is to investigate the relationship between oral health related factors and depression in adults more than 40 and less than 60 years, who are classified as the middle-aged adults in Korea using the second year data of the 6th National Health and Nutrition Examination Survey in 2017.

## **2 Study Subjects & Methods**

### **2.1 Study Subjects**

This study was conducted based on source data of 6th National Health and Nutrition Examination Survey (KNHANES) (2013~2015). 6,904 persons who completed the health survey and screening examinations, 1,916 adults more than 40 and less than 60 years were selected as the final subjects.

### **2.2 Study Method**

General characteristic include gender, age, marital status, economic activity, education level, and smoking status. Age was divided into 40~50 years old and 50~60 years old and marital status was divided into "single" and "married". Economic activity was classified into "active" and "non-active" and the education background was divided into "elementary school graduation or less", "middle school graduation", "high school graduation" and "college graduation or more". Smoking was divided into "smoking" and "non- smoking" (including former smokers). Depression was divided into "Yes" or "None" according to the doctor's diagnosis.

Oral health-related factors include experience of toothache, chewing problem, tooth damage, complaint of chewing, and permanent tooth caries over the last year. The process of this study was as follows (Fig. 1).

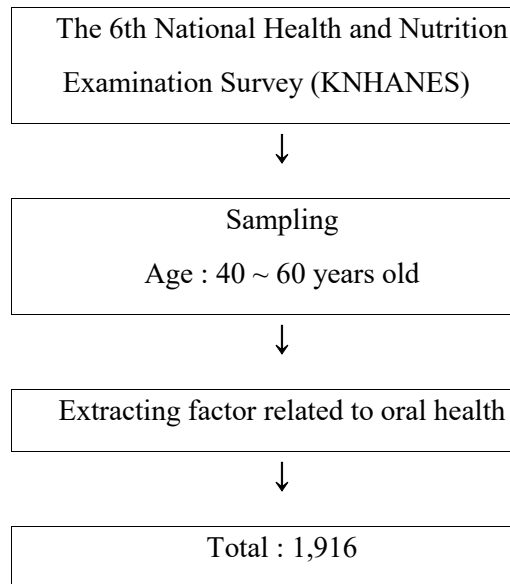


Fig. 1. Flow of this study

### 2.3 Statistical Analysis Method

In preparing the planning file in the complex sampling analysis, the complex samples including distributed estimate strata for strata variable and survey plot for cluster and medical check-up weights of the health survey for weights were designed and used in analysis as planning variables.

The cross analysis was used to understand the relationship between demographic factors and depression in middle-aged adults and the relationship between depressive symptoms and oral health factors in middle-aged adults, and the frequency analysis was used to understand to examine depression in middle-aged adults. The cross analysis calculation formula is as follows (Fig 2).

$$\chi^2 = \frac{\left( |ad - bc| - \frac{N}{2} \right)^2 \times N}{n_1 \times n_2 \times m_1 \times m_2}$$

Fig. 2. Calculation formula

The collected data were analyzed using SPSS (SPSS 17.0 for Windows, SPSS Inc, Chicago, IL, USA) program and the significance level of 0.05 was applied for the statistical significance determination.

### 3 Study Results

#### 3.1 Relationship between Demographic Factors and Depression in Middle-aged Adults

In Table 1, Relationship between demographic factors and depression in middle-aged adults. To see the relationship between demographic factors and depression in middle-aged adults, 3.9% of women and 1.0% were diagnosed with depression by doctors and, for the marital status, 4.7% of married and, for the economic activity, 2.6% of active were diagnosed with depression. 1.9% of for the educational background and 4.3% of non-smoking were diagnosed with depression. Especially, for women, active in economic activities and the less educated, the higher depression ( $p < 0.001$ ).

**Table 1.** Relationship between Demographic Factors and Depression in Middle-Aged Adults (N=1,916)

Variables	Category	Depression (%)	Non-depression (%)	Total (%)	P-value
Gender	Male	19 (1.0)	743 (38.8)	762 (39.8)	* 0.000
	Female	75 (3.9)	1,079 (56.3)	1,154 (60.2)	
Age	40 to 50	40 (2.1)	858 (44.8)	898 (46.9)	0.226
	51~60	54 (2.8)	964 (50.3)	1,018 (53.1)	
Marital Status	Single	4 (0.2)	74 (3.9)	78 (4.1)	0.540
	Married	90 (4.7)	1,748 (91.2)	1,838 (95.9)	
Economic activity	No	44 (2.3)	488 (25.5)	532 (27.8)	* 0.000
	Yes	50 (2.6)	1,334 (69.6)	1,384 (72.2)	
Education	≤Elementary school	20 (1.0)	177 (9.2)	197 (10.2)	* 0.000
	Middle school	20 (1.0)	253 (13.2)	273 (14.2)	
	High school	35 (1.9)	770 (40.2)	805 (42.1)	
	≥College	19 (1.0)	622 (32.5)	641 (33.5)	
Smoking	No	80 (4.3)	1,474 (76.9)	1,554 (81.2)	0.191
	Yes	14 (0.7)	348 (18.1)	362 (18.8)	
Total		94 (4.9)	1,822 (95.1)	1,916 (100.0)	

\* P < 0.001 Chi square

### 3.2 Depression of Middle-Aged Adults

In Table 2, To see depressive symptoms of middle-aged adults, it was found 12.5% answered the continuous depression over 2 weeks, 4.9% answered that they were diagnosed with depression, and the time of depression diagnosis was 33.0% in 41-50 years old. 61.7% answered they have depression and 58.5% answered they are not treated with depression.

**Table 2.** Depression of Middle-Aged Adults

Variables	Category	N	%
Continuous depression over 2 weeks	No	1,677	87.5
	Yes	239	12.5
Depression diagnose by doctors	None	1,822	95.1
	Has exist	94	4.9
Depression diagnosis time *	20 or less	4	4.3
	21~30	3	3.2
	31~40	28	29.8
	41~50	31	33.0
	51~60	28	29.8
Presence of depression	None	36	38.3
	Yes	58	61.7
Depression treatment *	None	55	58.5
	Yes	39	41.5
Total		1,916	100.0

\* Responses from 94 (100.0) persons with depression diagnosed

### 3.2 Relationship between Oral Health Factors and Depression in Middle-aged Adults

In Table 3, To see the relationship between oral health factors and depression in middle-aged adults, the depression prevalence rate was found to be 2.8% when they recognize their oral health conditions are poor, 2.6% when they experienced toothache over the last year and, 4.7% when the experienced the permanent tooth caries respectively. When they have significant chewing problems, 1.4% was diagnosed with depression, and when they claim the chewing problems, 3.3% were diagnosed with depression.

When they experienced toothache over the last year, have significant chewing problems or claim the chewing problems, it was found they have significant relationship with the prevalence rate of depression statistically.

**Table 3.** Relationship between Oral Health Factors and Depression in Middle-Aged Adults

Variables	Category	Depression (%)	Non-depression (%)	Total (%)	P-value
Oral health status recognized by themselves	Poor	48 (2.8)	744 (42.9)	792 (45.7)	0.309
	Average	32 (1.8)	661 (38.1)	693 (39.9)	
	Good	7 (0.4)	241 (14.0)	248 (14.4)	
Experience of toothache for the last year	No	42 (2.4)	602 (34.7)	644 (37.1)	* 0.019
	Yes	45 (2.6)	1,044 (60.3)	1,089 (62.9)	
Experience of permanent tooth caries	No	6 (0.3)	146 (8.4)	152 (8.7)	0.345
	Yes	81 (4.7)	1,500 (86.6)	1,581 (91.3)	
Total		87 (5.0)	1,646 (95.0)	1,733 (100.0)	
Chewing problem	Not inconvenient at all	10 (0.5)	68 (3.5)	78 (4.0)	* 0.012
	Not uncomfortable	20 (1.0)	326 (17.0)	346 (18.0)	
	So-so	18 (0.9)	339 (17.7)	357 (18.6)	
	Uncomfortable	20 (1.0)	448 (23.4)	468 (24.4)	
	Very uncomfortable	26 (1.4)	641 (33.6)	667 (35.0)	
Complaint of chewing problems	No	30 (1.6)	394 (20.6)	424 (22.2)	* 0.016
	Yes	64 (3.3)	1,428 (74.6)	1,492 (77.9)	
Total		94 (4.9)	1,822 (95.1)	1,916 (100.0)	

\*  $p < 0.05$  Chi squared

## 4 Review

This study was to investigate the relationship between oral health factors and depression in Korean middle-aged adults using data from the 6th National Health Survey (2013~2015).

Studies have shown that the prevalence of depression in middle-aged adults is 4.9%, which is lower than the result of 22.2% in the study of Lee, *et. al.*, [9]. However, 12.5% of the respondents felt depressed for more than 2 weeks. In particular, considering 62.8% of the respondents were diagnosed with depression at 40~50 years of age, middle-aged adults do not feel the importance of health

conditions or have not prepared for it. In addition, the middle age should take the responsibility of raising children and supporting their parents, and are stressed by various additional roles and seriously affected physically and mentally [10].

During economic activities, 2.6% were diagnosed with depression, and the stress of social life is considered to be the cause of depression. In this study, statistically significant results were obtained in the relationship between education level and depression, and it has been reported that education level is a major determinant in socioeconomic status because it directly or indirectly affects the health through various routes (19 and 20). In the study of Ross and Wu [11], depression was found to be low in the health conditions of the group with high level of education.

It has been found that depression has a statistically significant relationship with oral health factors when they experienced toothache, have chewing problems, and claim mental discomfort during the last year. Oral health is closely related to health of the whole body and the problem in chewing deteriorates the chewing ability, narrows the scope of food selection and deteriorates the quantity and quality of foods for intake, which makes it difficult to maintain the health and physical strength [12]. In addition, oral health may affect pronunciation and appearance, and therefore, tooth loss or other masticatory discomforts can increase the prevalence of depression by promoting social isolation and alienation [13-15]. In other words, the oral discomfort factors are considered to increase the depression.

For the limitation of this study, 94 persons, the number of subjects with depression is very small and it is difficult to generalize the results. In addition, the National Health and Nutrition Survey is very difficult to find a causal relationship with the survey data. Nonetheless, it is significant to examine the relationship between oral-related factors and depression in middle-aged adults by using the National Health and Nutrition Survey which can represent Korea and I hope the comprehensive study on not only depression but also oral health status, mental health or.

## 5 Conclusion

In this paper, this study examined and analyzed the relationship between oral health factors and depression for 1,916 middle-aged adults aged 40 ~ 60 years old based on the source date of the 6th Korea National Health and Nutrition Examination Survey (KNHANES) (2013~2015) and obtained conclusions as follows:

1. Middle-aged adults showed more depression when they were female, economically active, and less educated ( $p < 0.001$ ).
2. The time when depression was diagnosed is 41~60 years old (62.8%) applicable to the middle age and it was surveyed 58.5% did not take treatments after diagnosed as depressed.
3. In the relationship between oral health factors and depression in middle-aged adults, the prevalence of depression was high when they experienced toothache, chewing problems, and mental discomforts during the last year ( $p < 0.05$ ).

Since these results as above suggest that the oral health factors of middle-aged adults may affect depression, which may also negatively affect the quality of life, it is anticipated the measures to promote the motivation and interest in oral health of middle-aged adults may be prepared.

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